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ABSTRACT

In January 1994, Arizona's Maricopa Community College District issued a request for proposals to develop new administrative software applications to solve problems related to high maintenance costs for existing systems and difficulties in updating software. The result was the Apollo Project, in which the District contracted with Oracle Corporation and Axiom Business Consultants to implement Oracle Government Financials (OGF), a purchasing and accounts payable system; a new Learner Centered System (LCS), designed to collect information on student goals and help them devise a plan of study; a human resource and payroll system; and an electronic mail/office automation system. The Apollo Project involved the following six phases: (1) establishing a context, involving the examination of institutional goals, mission, and external factors; (2) establishing a framework for implementation; (3) defining a model of the new systems that emphasized the most innovative elements; (4) designing and building the system; (5) implementation; and (6) effecting continuous improvement. The most important issue in the project was the creation of an all inclusive system that would meet the needs for information cross-functionally rather than the implementation of separate systems unable to talk to one another. Currently, OGF is online and plans are underway to implement and test the LCS at two colleges in summer 1997. Two key elements of the project were the ability of personnel to be aware of different perspectives and to be flexible. (HAA)

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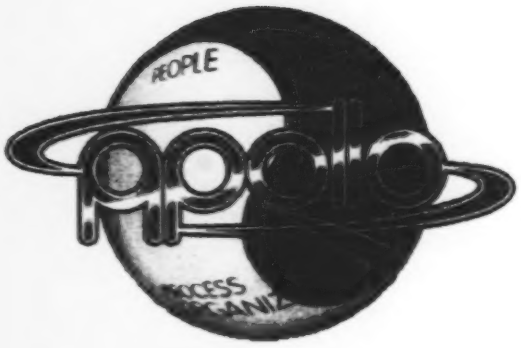
Maricopa Community College District

Apollo:

Changing the Way We Work



A status report on Maricopa County Community College District's Apollo Project, including lessons learned in the midst of a very complex administrative applications implementation process.

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Apollo:

Changing the Way We Work

Background

Maricopa County Community College District (MCCCD) is the second largest community college district in the United States with ten autonomous colleges and one skill center, serving nearly 90,000 credit students each academic semester.

The planning activities for the replacement of administrative software at Maricopa began nearly four years ago. In early 1993, Information Technology Services (ITS) leadership began visiting with user groups at the colleges and with district-wide functional groups to develop the ITS strategic plan. With minor changes, the plan was then published jointly by CAUSE and the League for Innovation in the Community College under the title *The Learning Action Plan: A New Approach to Information Technology Planning in Community Colleges*

The VAX systems used throughout the district were becoming more expensive to maintain (and less responsive as the load increased). Because of the nature of the original development tools, the existing software was increasingly difficult to update or modify and could not easily react to changing needs for information. Specialists spent much of their time creating special reports because of the difficulty of accessing information. While the existing systems housed considerable information, the information was segregated into separate flat file databases which did not easily share or compare information. Many ancillary systems were developed to meet specific information needs, adding to the challenge of keeping information synchronized and providing support for the various systems.

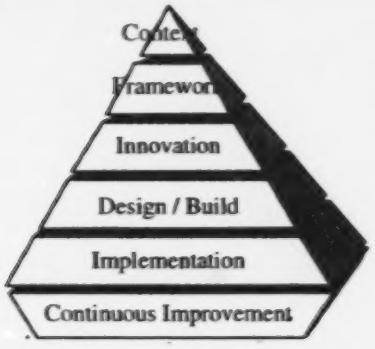
The district programming staff was skilled in COBOL but was drowning under requests for modifications and new features from functional user groups. In many cases, these groups provided extensive lists of requests for upgrades, modifications, and new features which the programmers worked on as time allowed. In each case, the programmers were working directly with functional groups. These people were looking at information needs for their specific function without regard for the impact on other systems, users, or organizational groups.

These issues served as the impetus for the development of a Request for Proposal (RFP) that was released in January 1994. Over 300 people representing all colleges, policy

groups, and interest areas gave their input into the development of the RFP. Inherent in the RFP was the assumption that Maricopa's existing processes would be studied for opportunities to make major process improvements before developing new software solutions, especially in the area of student systems. This "renewal" process had previously been attempted by a small cross-functional team reviewing the curriculum approval process in December, 1993.

According to the RFP, it was the intention of Maricopa to begin development and/or implementation of new administrative applications during the 1994/95 fiscal year and replace all administrative applications within two years from the beginning of the project.

In July of 1994, Maricopa contracted with Oracle Corporation and included in that contract Business Renewal™ consulting services from Axiom Business Consultants as a subcontractor for the new Learner Centered System (LCS). Four major systems were included: implementation of Oracle Government Financials (OGF); development of a new Learner Centered System; implementation of a Human Resource and Payroll System; and implementatoin of an e-mail/office automation system.



The Apollo Project contract was signed on the anniversary of the initial lunar landing, thus the name. It has taken on a life of its own and become, at least to us, nearly as complex a project. The project was planned with a phased approach with each phase becoming more detailed and complex.

The "Context" phase looked at the Governing Board Mission and Goals and environmental factors impacting the institution. The work during this phase was accomplished by the Apollo Executive Steering Team including functionally diverse representation from each of Maricopa's ten colleges and the District Office. The use of cross-functional groups was something relatively new to the Maricopa culture.

The Apollo Executive Steering Team created their "Context Report" and made it quite clear that the most important issue was the creation of an all inclusive system that would meet the needs for information cross-functionally rather than the implementation of separate systems unable to talk to one another.

The scope of Apollo grew with the Context Report. The report made it very clear that Maricopa should be learner-centered and base decisions on what was best for the learner or student rather than what was the most convenient from a traditional functional perspective. The concept of longitudinal processes crossing functional boundaries became central to the project concept. In addition to the four major areas of functionality previously mentioned, the Apollo project was given responsibility for the replacement of the existing Budget Development System and the provision of new desktop computers for all full-time employees.

There were two items that were to be handled outside the scope of the Apollo project. One of these was major upgrades to both the wide area and local area networks throughout the district. In 1993, CAUSE gave Maricopa an award for the network

system. Maricopa has been using a wide area microwave network system tying the colleges together at T1 speeds, but with the growth of Internet and client-server architecture, the existing network will not have enough bandwidth. The network project; while not considered part of the Apollo Project, is crucial to the success of Apollo and is progressing in parallel. An additional project that was not identified as part of Apollo is the implementation of a help desk structure.

After the Apollo Executive Steering Team created the Context Report, the Learner Centered System Steering Team, again a cross-functional team of approximately 30 people, began laying out the framework of desired functionality for the Learner Centered System (LCS). In many cases, desires reflected existing functionality. Within weeks, it became obvious the team desired a major area of functionality that had never been used before in the District — the concept of a learning plan. The team defined a process to meet with the learner at the initial point, determine their goals and objectives, and then help them create a program of study that would meet those goals.

The intent was to create the course schedule using information captured in the learning plans. Thus, it was envisioned a learner could come saying, "I can only go to school half-time in the evenings on Tuesdays and Thursdays. I want to get an AA degree and transfer to the university for a major in Education." Armed with this information, (much of which Maricopa had never captured before,) the learner's needs could be met more effectively. Implicit in the LCS project is the desire to create a scheduling engine that is proactive in meeting the needs of learners. This is a much larger scope than what had originally been anticipated when the initial contracts and timelines were developed.

Approximately six months into the project it became very obvious that the timeline was overly optimistic and could not be met. A number of factors impacted the decision including the number of staff available, their skill set and knowledge of the Oracle 7 database, UNIX, DEC Alpha servers, Oracle CASE tools, and SQL, and time conflicts because of continuing legacy support.

In addition, working with cross-functional teams on the development of a systemic perspective was very different as well. These issues made it quite clear that is was mandatory to create a new project timeline. The implementation of Oracle Government Financials (OGF) was moved from July, 1995 to July, 1996, for example. Each of the other sub-projects had timeline shifts in an effort to match workload to available staff while remaining inside the "Year 2000" impact window.

At the completion of the Framework Phase of the LCS project in May, 1995, the Framework Report was presented to the Apollo Executive Steering Team. With their support, the contract with Oracle was modified to provide more resources to support the third phase of the project where the CASE model was to be defined down to the leaf level. Modification of the contract resulted in a faster resource burn rate than originally anticipated. The contract was modified to retain Oracle's help through the third phase of the project, resulting in a data model and a functional model defined with emphasis on those areas the Steering Team considered most innovative. The Apollo Executive Steering Team understood this change would result in the need for an additional contract with Oracle or a third party to help build LCS.

While LCS was involved with the Framework and Innovation phases, the OGF team was busy. For a number of reasons, leadership chose to implement OGF packages (GL, AP, Purchasing, and Fixed Assets) while trying to duplicate functionality of the existing system rather than changing processes. The only exceptions were inclusion of a new account code structure and on-line requisitions. While this team would have liked to look at some of the existing processes, there were not enough Renewal Analysts (functional analysts) for this project as well as the LCS project. OGF version 10.5 went into production July 1st in a character-cell format. Once the network upgrades and other systems are in place, it will likely be upgraded to a GUI version such as 10.7.

Concurrent with the two major projects underway, Apollo team members continued to look at other pieces of the puzzle. Maricopa originally held an option to purchase the Oracle Human Resources system but the available version did not support position control which was considered mandatory. The HRMS project was put on hold for a period of time. A team continued looking at office automation. One of the things coming out of the Learner-Centered System project was the desire that all students be given an e-mail account. The size of the Oracle Office package and its implications on client hardware requirements were such that this solution became cost prohibitive. The Office team continues to look at other possible solutions.

The current project status has Oracle Government Financials live. Maricopa has contracted with Buzzeo, Inc. to include the vision of the Learner Centered System in their SISLogix product. Plans call for implementation and testing of LCS at two colleges and the District Office starting in the summer of 1997 with all colleges going live in January, 1998. Responses to a Request for Proposal for Human Resources (including Payroll, Time & Attendance, Benefit, Employment, etc.) and the Budget Development System are being evaluated with vendor selection as early as December. The Office Automation team continues to look at e-mail packages; especially standards-based systems. A browser based package with support of IMAP, for example, could be an interesting option for the students, but a decision has not yet been made. The desktop hardware implementation project has gone fairly well with the colleges busy installing upgraded machines.

Year 2000 issues continue to drive our timelines. The Human Resources System and the Budget Development System need to be in production by July of 1998, and an e-mail selection made so that implementation can begin around that time. The size and complexity of the complete project when combined with resource constraints and new methodology has caused us to learn many lessons.

Relationships

It was the intent of Maricopa to form a strong partnership relationship with a single vendor. Oracle brought with them as part of the contract, Axiom Business Consulting out of San Francisco, with skills in Business Renewal™ for the reengineering component. As the project continued, it became clear to all the parties that there was a need to partner with an additional vendor to build out the Learner Centered System. In March, 1996, Maricopa contracted with Buzzeo, Inc. of Phoenix to build LCS from the information and materials captured in the framework and innovation phases led by Axiom and Oracle.

Currently, there are three major vendors involved. Oracle with the Oracle7 database and Oracle Government Financials; Axiom with their Business Renewal™ methodology; and Buzzeo with the SISLogix package they're developing based in part on the information that we're providing. There is a possibility of additional vendors for human resources and e-mail/office automation. We've learned that it is especially important to manage the expectations of these multiple vendors.

The original RFP was written by Information Technologies staff at the District Office. Many people throughout the district envisioned it as an IT project solely intended to replace the administrative computing systems. Because of the vision of the Apollo Executive Steering Team, it rapidly became apparent that more than one division needed to be involved. Dr. William Waechter, Vice Chancellor for Quality and Employee Development became co-chair of the Steering Team, joining Ron Bleed, Vice Chancellor for Information Technologies who had served as chair. In addition, the Steering Team membership now includes Dr. Rufus Glasper, Vice Chancellor for Business Services and Dr. Alfredo G. de los Santos Jr, Vice Chancellor for Educational Development.

The Apollo Executive Steering Team includes all four Vice Chancellors, and representatives from all of the colleges. Every college has key people involved. In fact, key project leaders have included students, faculty, and staff on loan from colleges and district departments.

Every team from the Apollo Executive Steering Team to sub-teams on the various projects has been cross-functional. While TQM principals have had an impact for several years, this is the first major project approached with cross-functional involvement as a core concept. Axiom articulated a model that includes four threads: People, Process, Organization, and Technology. This concept coincided with the cross-functional emphasis. Early in the project it became apparent that managing and developing relationships and assuring understanding was a significant part of the process.

It is not possible to simply regard Oracle and Axiom, for example, as contractor and subcontractor. Each brings special expertise and is valued for that expertise. Each also brings their own language and assumptions. In turn, vendors learned to listen to the client, recognizing language and cultural constraints.

Throughout this project, whether it be IT people sharing with Ed Development people, small college people sharing with large college people; or fiscal agents sharing with faculty, a vital thing has been awareness of different perspectives and vocabularies. It's been important to apply a cross-cultural perspective in order to clearly understand what was said and the perspective shaping the statement. This is a major shift from working in functional groups where each member of the group shared a common understanding.

In addition to the TQM involvement and emphasis for the past several years, there's been an interest in "systems thinking" as described by Peter Senge in his book ***The Fifth Discipline***. This has received considerable recognition from leadership, but many staff have disregarded it. The Apollo Project makes it clear that Maricopa must be thinking as a system, rather than from an individual functional viewpoint. Each decision impacts the total system.

It's quite easy for a functional group to say, "We need to be able to do this and we should be the only person to change this data" or "this data must be used in this manner." It's quite another thing when individuals begin to understand how that data is used by others not directly associated with their functional area. The determination of the appropriate process for capturing data, modifying data, and ensuring data accuracy is much more complex from a systemic viewpoint as compared to the traditional functional viewpoint. This cross-functionality and systemic awareness has had major impacts on fiscal and time resources, but a much better system will result.

What has been learned?

Keep the vision, but approach it with flexibility. Understand the goal and assure that all components are adding value towards reaching that goal. Understanding the goal makes it easier to think systemically rather than being restricted to functional boxes. Approach the vision with flexibility and learn from experiences. Try something — if it doesn't seem to work, try something different, but keep an eye on the goal.

Try not to be *totally* driven by timeline constraints. If timeline is the only driver, it's too easy to do what is expedient rather than what is right. Balance the timeline with a vision of the goal.

Another major lesson not yet internalized relates to scope and size limits. Originally, the Apollo project was to be done in a two year timeframe. We're nowhere near done; we're perhaps approaching halfway with the core applications. We didn't have a realistic expectation of what could be accomplished with the existing personnel resources. Very high productivity was anticipated, but we're learning that it is remarkably important to manage expectations and scope. We were fortunate enough to be able to go back and rework budget, time, and scope to reflect some of our personnel resource limitations.

There is no such thing as adequate communication or change management. Each person receives information and filters it with their own biases. In an era of limited staffing and resulting competition with other organizational initiatives, it is very important that people understand clearly what is being done, when, and how it will affect them. While Apollo will have wide ranging impact on everyone in the organization, very few understand and are preparing for the changes.

Project management is a lesson in the process of being learned. A single point of contact and communication with each vendor and each college or department providing staffing is an important feature.

Pay attention to the consultants. Consultants are being used for support and to confirm the reality of the envisioned scope. Many times we have said, "This is what we want to do, this is how we think we should do it, and this is what we think will be accomplished." Quite often, the consultants have said, "We don't think you can do all that." Our response has invariably been, "but you don't understand Maricopa, we're sure we can do that." In most cases, the consultants have been kind enough to swallow the "I told you so" that could have come from the resulting schedule slippage and we come out somewhere in between what we thought we could do and what our consultants thought was practical.

Staff development can't be emphasized enough. Doing this over, and if the culture would support it, staff development should begin two years before the project. So many development areas are not technical skills, but rather attitudes and habits, teamwork issues, and systems thinking skills.

Put internal resources on the new strategic projects and outsource support for legacy. When programmers are asked to maintain the legacy system *and* learn new skills, no one is happy. Individuals uncomfortable with new tools and processes will spend major amounts of time maintaining the legacy systems and their comfort zone if you give them the option. Train staff on the new, assign them totally to the new, set high expectations and then help attain them.

Maricopa didn't include any preparation for web technologies. When the original RFP went out, it didn't say "web" anywhere in it. Now it's so important to have appropriate web skills and appropriate systems thinking skills. People need to be looking at the whole picture including data access, the ease of installing client software, and the ease of training.

Finally, the average person in the organization expects that system implementation is relatively simple. They will not understand why so many people, so much time, and so many dollars go into it. In spite of that, implementing a new system is an excellent time to demonstrate by example the new way of doing business — with a cross-functional process orientation.

For more information about Maricopa's Apollo Project, point your frame capable web browser to http://www.dist.maricopa.edu/apollo/apollo.htm

Suggested Reading

Hammer , Michael. *Beyond Reengineering*. New York: HarperBusiness, 1996.

Kriegel, Robert and David Brandt. *Sacred Cows Make the Best Burgers*. New York: Warner Books, 1996.

Senge, Peter M. *The Fifth Discipline*. New York: Doubleday, 1990.

The Mission of APOLLO is to identify and implement innovative organizational and technological changes to move Maricopa Community Colleges toward an optimal environment that supports effective teaching and learning.

Improve accessibility to information and services for learners, faculty and staff.

- *identify baseline hardware and software standards to access APOLLO developments*
- *streamline access to information*
- *develop and implement highly integrated information systems*
- *establish and maintain consistent look and feel across all applications*
- *provide training, documentation, and functional user support.*
- *establish a common language dictionary across all applications*
- *ensure information exchange with the external communities.*
- *enable user access to rules/procedures/policies, etc.*

Optimize communication.

- *improve student communication with other students, both full and part-time faculty, and staff*
- *improve faculty-to-faculty communication*
- *improve cross-functional communication among all internal communities*
- *improve connectivity and communication with external communities*
- *provide broad user access to Maricopa rules, policies, and procedures*
- *improve dialogue opportunities between and among internal and external communities*
- *improve information management by providing information literacy and information management training*
- *establish standards for responsible and ethical access and use of information and data security*
- *provide learners with the capability of advising the college of their specific course, programmatic and scheduling needs*

Enhance the usefulness functionality and flexibility of applications, processes and products.

- *design applications in such a way that applications can be modified or evolve to meet changing needs*
- *develop full functional applications*
- *use cross functional teams to complete process analysis and business process reengineering activities to identify the functional requirements needed in new applications*
- *increase timeliness and responsiveness of application development and implementation to meet the needs of learners, faculty, and staff*

Identify learner, faculty and staff needs, and deliver the related services in a timely manner.

- *develop a method for timely assessment of market demand*
- *perform research and development for identifying demand trends.*
- *monitor technology changes impacting our research and development effort.*
- *identify problem points and determine a method for revisiting those areas.*
- *develop an MCCCD methodology for assessing the faculty and staff needs*
- *establish new approaches to user groups and their roles develop an evolution from "old" processes to new processes.*

Upgrade the technological infrastructure that will enable Maricopa to develop and implement applications and services.

- *provide technical training to all technology professionals within the Maricopa Community Colleges*
- *provide new, state-of-the-art information technology tools for use by all technology professionals within the Maricopa Community Colleges*
- *establish and follow a standard development methodology district-wide for all application development efforts*
- *utilize a variety of media (voice, data, video) in providing technology solutions to meet the needs of learners, faculty and staff.*
- *identify, plan for, and use emerging technologies to provide technology solutions to meet the need of learners, faculty and staff*

Foster cultural change to support achievement of the Apollo Mission.

- *empower people and encourage dialogue*
- *serve as a catalyst for discussions regarding barriers to learner access to information and technology including affordability, accessibility, training, language barrier and learning styles*
- *encourage and support creative thinking, innovative approaches and risk taking in the development of new information applications and processes*
- *expand "ownership" of applications to broader communities outside of the ITS department*
- *interface with other Maricopa Community Colleges district-wide and/or college initiatives that are also trying to change the organizational culture of our colleges*
- *make recommendations regarding Maricopa's reward systems for individuals, teams, colleges, etc. based upon process analyses and new application development activities*
- *make recommendations regarding the organizational structure changes needed to support new processes and applications*

Directly support students and faculty in the teaching and learning process.

- *provide tools for access to direct and indirect delivery of instruction*
- *provide tools that will enable us to better track student and increase retention and academic achievement*
- *provide application and tool training for faculty and students*
- *provide faculty with the tools to assess student learning relative to the students themselves, and students in groups*